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December 30, 1961

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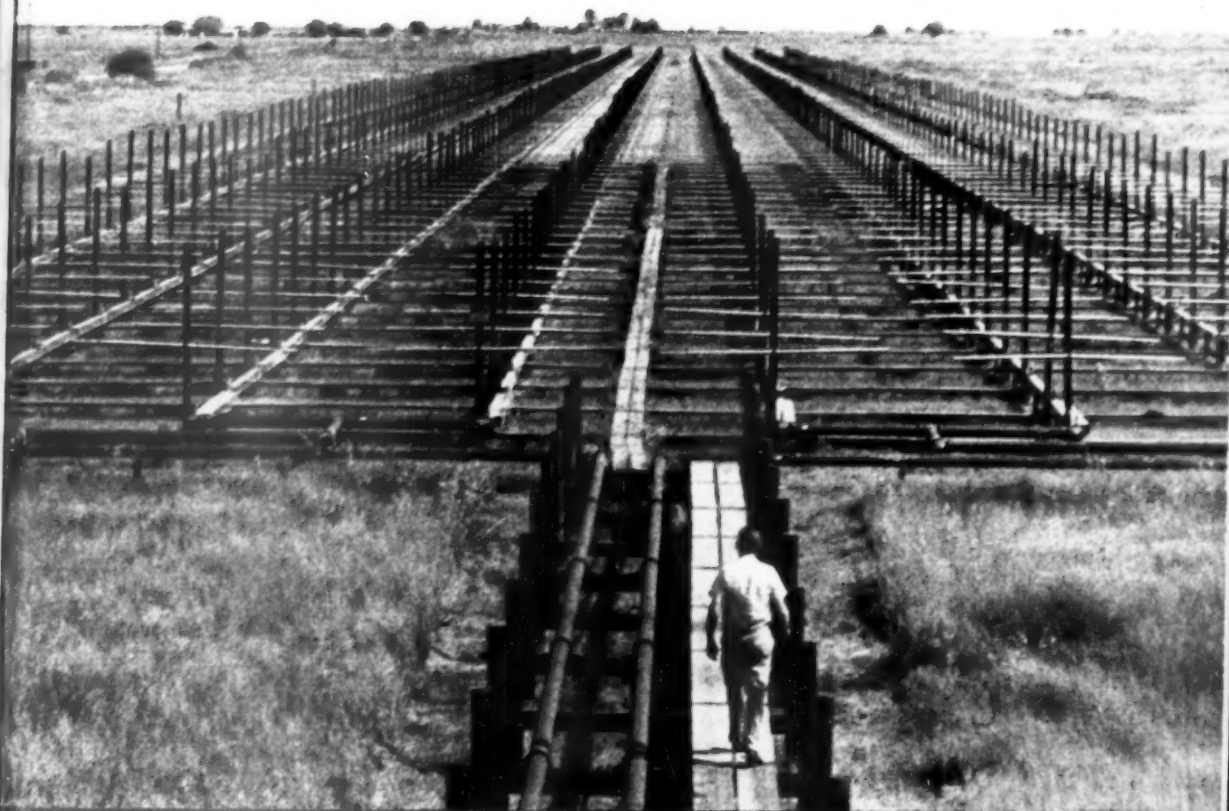
VOL. 68, NO. 27

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# SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE



Radar Yardstick to Sun

See page 433

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# OFF-THE BEATEN PATH

WHERE TO RETIRE OR VACATION . . .  
AT WHAT LOOK LIKE PREWAR PRICES

## These are America's Own Bargain Paradises

costs are low), of areas with almost a perfect climate and with flowers on every side.

Here are the real U.S.A.-brand Shangri-Las made for the man or woman who's had enough of crowds. Here, too, are unspoiled seashore villages, tropics like islands, and dozens of other spots just about perfect for your retirement or vacation at some of the lowest prices you've heard of since the gone-for-ever prewar days. And for good measure you also read about the low-cost paradises in Hawaii, the Virgin Islands, and Puerto Rico.

You can be sure that *Off-the-Beaten Path* names the low-cost Florida retirement and vacationing towns, the best values in Texas, the Southwest, California, the South and East, Canada—and a dozen other areas which the crowds have not yet discovered:

- That undiscovered region where winters are as warm as Miami Beach's yet costs can be two-thirds less.
- That island that looks like Hawaii yet is 2000 miles nearer (no expensive sea or air trip to get there).
- France's only remaining outpost in this part of the world—completely surrounded by Canadian territory . . . or a village more Scottish than Scotland or age-old Spanish hamlets right in our own U.S. where no one ever heard of nervous tension or the worries of a modern day life.
- That remarkable town where a fee of \$3 a day gives you an almost endless round of barbecues, musicals, concerts, picnics, pot luck suppers, smorgasbord dinners, and a fine arts program.

*Off-the-Beaten Path* is a big book filled with facts that open the way to a different kind of retirement or vacation made all the more attractive by the rock-bottom prices. About 100,000 words and plenty of pictures. Yet it costs only \$2.

## FABULOUS MEXICO where everything costs less

The land of retirement and vacation bargains—that's Mexico

Where you can build a modern home for \$4,500 and an American retirement income looks like a fortune. It's the land where your vacation money can buy double or more what it might back home—provided you know where to go for Mexico's best values.

Norman Ford's big book MEXICO—WHERE EVERYTHING COSTS LESS tells you exactly where to get all of this country's best vacation and retirement values, where you can live like a prince on what you might just get along on in the U.S.A.

Norman Ford knows Mexico from north to south, from east to west, and he takes you to vacation and retirement areas that look more like the South Seas than Tahiti itself; to whole sections of just perfect weather where it's like June all year round; plus resort after resort, towns, cities, spas, and what not else where you'll have a vacation to remember at a cost so low it could seem unbelievable.

If you want a delightful retirement area with plenty of Americans around to talk to, he leads you to all the principal retirement towns, as well as dozens of little known, perhaps even more delightful areas, where costs are way far down, there's plenty to do and meeting people is easy. Always, he shows you modern, flower-bedecked hotels and inns that charge hardly half of what you might expect to spend in even such a land of vacation and retirement bargains as Mexico.

There's a great deal more besides: everything from exploring ancient pyramids as old as Egypt's to finding fabulous hunting and fishing. If you might want to share in the high interest rates Mexican banks pay or to buy equally high-earning real estate or start a business of your own, this detailed guide to a fabulous land tells you what you must do to start your money earning so much more than in the U.S.

MEXICO—WHERE EVERYTHING COSTS LESS opens up Mexico to you. It's a big book, yet it costs only \$1.50. So send for yours today.

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Are you driving? Thomas B. Lesure details the best roads to take, the scenic turn-offs, the outstanding motels and restaurants to pull up to.

Are you traveling in other ways? Here's the data you want about seeing the West without a car of your own.

Do you want a stay-put vacation? There's so much to do in the West—all the usual activities plus such things as prospecting for gold, dude ranching, mountain climbing, boating, hunting, etc., and Thomas B. Lesure makes sure you fill all your time with day after day of fun.

Going with children? You need his full rundown of the things in the West that will capture their interest.

What about tipping? Is it different out West? Here are the facts you need every day on whom, when, and how much to tip.

And there's still much more to this 170,000-word book (a book as long as three novels): how to get FREE souvenirs, where to find excellent buys in Indian blankets, how to visit the Indian villages, even such information as where to find the best places to live or retire in all the West.

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## GEOPHYSICS

# Earth Has Helium Halo

Helium shell 900 miles thick surrounds earth. The halo reaches 1,500 miles, above which hydrogen extends into the interplanetary space, Ann Ewing reports.

▶ THE EARTH HAS A HALO of helium surrounding it in a shell 900 miles thick, starting some 600 miles above the surface.

Information radioed to earth from Explorer VII confirmed the existence of this helium halo, Dr. Robert Jastrow of the National Aeronautics and Space Administration's Goddard Space Flight Center, Greenbelt, Md., said in Washington, D. C. The idea that earth would have a surrounding shell of helium was first suggested by Prof. Marcel Nicolet, director of the Centre National de Recherches de l'Espace, Brussels, Belgium.

Dr. Jastrow reported on results of space experiments in the 25th Wright Brothers Lecture at the Institute for Aeronautical Sciences in Washington. He said the earth's atmosphere was now thought to be a mixture of mainly nitrogen and oxygen molecules up to about 75 miles, then a layer consisting predominantly of atomic oxygen between that height and 620 miles. Beyond that is the helium halo, which extends up to 1,500 miles, above which is a hydrogen atmosphere that extends out into the interplanetary medium.

The average temperature of the upper atmosphere is 2,000 degrees Fahrenheit, Dr. Jastrow reported, and it shows daily fluctuations, being highest in the late afternoon and lowest in the early morning. Because the upper atmosphere is extremely responsive to the sun's output, scientists have been able to predict its temperature during the current sunspot cycle, which is now approaching the low point of its 11-year cycle.

The pre-dawn temperature of the atmosphere will reach a low point of 440 degrees Fahrenheit in 1964. The density of the upper air merges into the density of the interplanetary gas at an altitude of about 6,000 miles. However, instruments on the very early satellites showed that an additional layer of particles in the upper atmosphere, which includes the Van Allen belts, is now known to reach out to about 60,000 miles.

This additional layer of particles is called the magnetosphere, because it exists only due to the presence of the earth's magnetic field. Dr. Jastrow said its discovery was the most significant contribution of the International Geophysical Year and of the first years of the space program, not only because the radiation may prove to be a hazard to manned space travel, but more because of the role the Van Allen particles have in influencing the properties of the upper atmosphere.

The Van Allen zones are related to the process by which energy is transferred from the sun to the earth in the form of

particles, magnetic fields and radiation during major solar flares. The effects of this energy transfer involve not only temperature changes but magnetic storms, the aurora and radio communication disturbances. There have even been suggestions of a correlation between flare activity and the weather.

The available evidence suggests that the Van Allen zones and the entire magnetosphere of which they are a part constitute a reservoir in which solar flare energy can be stored in the form of trapped particles until a subsequent solar event disturbs the magnetic field. The particles are then dislodged from the zones "as apples are shaken from a tree," Dr. Jastrow reported.

The shaking occurs, he said, when the oncoming solar plasma cloud hits the earth's magnetic field, producing changes in the field that scatter the particles out of their spiraling orbits around the lines of force.

When the particles are dislodged, they descend through the horns of the Van Allen zone, transferring their kinetic energy to the atmosphere by ionizing collisions. This is probably the cause of the aurora, Dr. Jastrow said. He urged that future research be concentrated on measuring the low-

energy particles in the trapped radiation zones.

Preliminary research suggests that at an altitude of 2,100 miles, there is a heavy concentration of electrons with energies between 10 and 20 volts, Dr. Jastrow said.

The frequency of solar flare occurrence varies during the 11-year sunspot cycle. Flares are always accompanied by intense magnetic effects, as much as 1,000 gauss (a unit of magnetic density), which are in some way connected with their generation. As a cloud of charged particles erupts from the site of the flare and moves out into interplanetary space, it drags along the magnetic field of the flare site.

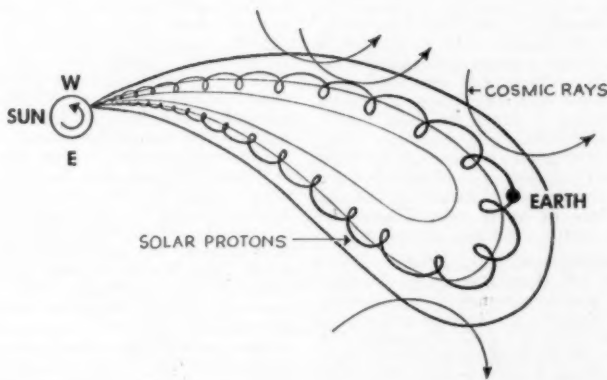
The magnetic field is frozen in the plasma cloud and must move with it because of the high electrical conductivity of the plasma. Thus the cloud expands into space, drawing out the lines of magnetic force like loops of taffy. Although the strength of the magnetic field lessens as the cloud expands, it is still appreciable when it envelops the earth and the roots of the field always remain within the flare site on the sun, Dr. Jastrow said.

When a flare erupts in the direction facing the earth, the radiation and the clouds of charged particles travel across space to collide with earth's atmosphere. Although the energy carried by the solar stream is less than one-millionth of that radiated by the sun in the form of visible light, it nevertheless appears to be responsible for the many geomagnetic effects, such as auroras.

Dr. Jastrow paid tribute to Dr. Thomas Gold of Cornell University, Ithaca, N. Y., who outlined many of these ideas concerning the propagation of solar disturbances on the basis of "very slight evidence."

• Science News Letter, 80:427 December 30, 1961

## PROPAGATION OF SOLAR DISTURBANCES FROM SUN TO EARTH



**SPREADING SOLAR DISTURBANCE**—This drawing shows, many scientists believe, how the sun flings out some of its matter into space, enveloping the earth and causing many geomagnetic effects. Solar protons spiral along the lines of force, which still have their roots in the sun's surface where the flare occurred. The plasma cloud repels cosmic rays from space, resulting in the so-called Forbush decrease.



# SCIENTIA INTERNATIONAL

## NOVAS DEL MENSE IN INTERLINGUA

**Chirurgia.**—Multa victimas de arthritis ignora le facto que nove procedimentos chirurgic existe que pote assister les. Dr. L. Marmor del Schola Medical del Universitate California reporta que tal procedimentos frequentemente pote restabli le functiones del mano, alleviar pena, e meliorar le apparentia. Il es nondum certe que le effectos del chirurgia es permanente, sed in certe patientes le effectos benefic jam se ha mantenite durante periodos de duo e mesmo quatro annos.

**Hematologia.**—Dr. J. Buettner-Janusch del Universitate Yale reportava al Association Anthropologic American que nove evidencias indica un progressive adaptation evolutionari del hemoglobina al requirimentos del cerebro in le curso del evolution del primatos e del homine. In prosimias, como le lemures, le hemoglobina rende su oxygeno rapidamente, de accordo con le habitos activissime de iste creaturas arboree. In le anthropoides, le division del primatos con le plus complexe disveloppamento cerebral, le rendimento de oxygeno ab le hemoglobina es minus rapide que in le primitive prosimias.

**Meteorologia.**—J. W. Beel del Corporation Sandia in Nove Mexico reportava al Societate Meteorologic American que explosiones atomic, ben que lor energia es un parve fraction del energia de un huracan, possibilemente pote esser utilisate a modificar le effectos de huracanes, o a cambiar lor curso. Un possibilitate es le explosion de un bomba de alte energia in le oculo del huracan. Theoreticamente isto resultarea in le elevation ex le circulation del tempesta de un grande massa de aere sic e calide, e su reimplacemento per aere plus frigide, le qual, in su turno, debe impedir le disveloppamento del huracan.

**Meteorologia.**—Le tres satellites del serie Tiros del Statos Unite se ha monstate utile in le preparation de mappas meteorologic mundial. Tiros III ha obtenite photographias de 18 tempestas tropic in varie stadios de disveloppamento. Le plus notabile del successos de Tiros III esseva le discoperta del formation del huracan Esther. Informations recipite ab Tiros III ha essite utilisate per le Bureau Meteorologic del Statos Unite in le revision de su mappas. Un conferentia international de meteorologos esseva convenite in Washington a fin de instruer le scientistas de altere nationes in le technicas del utilisation del satellites. In le anno veniente le satellites Tiros va esser reimplaciate per satellites del serie Nimbus le quales debe esser mesmo plus utile que le Tiros in le collection e transmission de informations meteorologic. Le Nimbus va esser lanciate in orbitas polar que permittera a omne nation obtener directemente ab le satellites un mappa comprehensive del nubes in su proprie area e in le areas vicin.

**Pharmacologia.**—Drs. L. Lasagna e T. J. DeKornfeld del Universitate Johns Hopkins reporta que le nove droga methotrimetrazina, un derivato de phenothiazina, ha essite utilisate successosamente como surrogato de morphina in un serie de casos chirurgic. Quando illo es prendite in injectiones le nove droga ha un effecto analgesic equal a illo de morphina, sed le nove droga non causa narcomania. Con doses oral le effecto analgesic esseva inadequate e indesirable effectos secundari esseva observate. Nalorphina, le sol altere potente droga analgesic cognoscite que non causa narcomania, ha le infortunate disavantage de causar bizarre symptomas mental.

**Physica Atomic.**—Le prime experimento del statutone Commission de Energia Atomic

in le utilisation de explosiones atomic in le servicio de objectivos pacific occureva le 10 de decembre de iste anno. Un bomba atomic de un potentia moderate (equivalente a 5 kilotonnas de TNT) esseva explodite in le deserto de Nove Mexico a un profunditate de 360 metros, sub un deposito del sal. Le objectivo del test esseva le creation de un reservoi subterranean de calor—utilisabile pro fines industrial—a un costo economic, sin contaminar le aere o le aquas subterranean. Le successo—quasi complete—de iste experimento face probable altere applicationes non-militar de bombas atomic.

**Radiologia.**—Durante le passate 15 annos un studio del effectos de radiationes therapeutic e industrial ha essite conducite in 8 hospitales in Anglaterra e Scotia. Sir A. Bradford-Hill del Schola London de Hygiene e Medicina Tropic ha preparate un reporto super le observations facite usque nunc. Ecce tres de su conclusiones principal: (1) Routinari examines roentgenologic de 8.000 feminas pregnant non ha resultate in leucemia o damnos genetic in le feminas o in lor infantes. (2) Nulle effectos perniciose de radiation esseva observate in 433 feminas qui laborava con radium in le manufactura de horologios luminose. (3) Routinari examines roentgenologic executate in massa ha resultate in appreciable e innecessari exposition a radios X del glandulas sexual del patientes.

**Recercas de Cancere.**—Dr. F. L. Horsfall Jr., director del Instituto Sloan-Kettering pro Recercas de Cancere dice in un reporto que omne causas de cancro ha un elemento commun; un cambiamento del acido disoxyribonucleic intra le cellula. Iste substantia ha functiones importantissime in le hereditate e etiam in le disveloppamento del cellulas individual del corpore. Apparentemente cancro es causate per un alteration specific, ben que nondum definibile, del structura del acido disoxyribonucleic. In su reporto Dr. Horsfall mentiona le sequente specific progressos in recercas de cancro: (1) Il esseva trovate que un virus isolate ab transplantabile tumores human pote causar deformitates in le ossos immatur de hamsters neonate. (2) Alicun successos ha essite attingite in le uso de drogas toxic a limitar le crescimento de tumores durante que le tissus normal es protegit per un antidoto. (3) Methodos ha essite disveloppate pro le isolation del acido disoxyribonucleic ab le cancerogene virus de polyoma. (4) Studios de dece tumores, transplantate ab mammas ad in ovos fertile, indica que omne cancro ha su patrono characteristic de crescimento. (5) Un substantia simile a un virus ha essite identificate in animales que porta cancers transplantabile. (6) Un studio del influencia del glandula thyroide ha revelate interrelationes non previeamente cognoscite del functiones del glandulas endocrine. Iste interrelationes es probablemente importante in le curso de numerose e diverse morbos. (7) Personas con cancro del tissus que forma le sanguine, in consequentia del debilitation de lor processos immunologic, accepta plus facilmente que individuos normal le transplantation de tissus ab altere personas. (8) Le virus Egypto 101 esseva trovate in cellulas cancerose de 14 patientes. In alicun casos un certe grado de retardation del cancro ha essite observate. (9) Un agente simile a un virus esseva isolate ab cellulas que habeva assumite characteristics cancerose post un periodo de incubation in culturas tissular. Observaciones preliminari indica que le introduction de iste agente in culturas de cellulas normal resulta in le apparition in illos de characteristics maligne.

• Science News Letter, 80:428, December 30, 1961

## GENERAL SCIENCE

### Reading Interlingua

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• Science News Letter, 80:428 December 30, 1961

## SCIENCE NEWS LETTER

VOL. 80 DECEMBER 30, 1961 NO. 27

Edited by WATSON DAVIS

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AT TOKYO FAIR—Ronald Sakimura, 15, of Honolulu (second from right), represented the National Science Fair-International at the Fifth Japan Student Science Fair, Tokyo. He explains his research on nematode-trapping fungi to Japanese students and a Taiwan newspaperman.

## GENERAL SCIENCE

## News From Science Clubs

► SCIENCE CLUBS OF AMERICA turns the spotlight on the following clubs for the scope and effectiveness of their activities:

The HIOXOIH SCIENCE CLUB has been organized for 35 years at Phillips High School, Birmingham, Ala., and is active in current science as illustrated by its programs this year on Space Science and Fallout Shelters.

The members of the SCIENCE CLUB at the Harding Township School, New Vernon, N. J., have written and produced a science play and, also, presented Life on Mars, a debate, for a school assembly program.

The CAPERING CHEMICALS of Our Lady of the Holy Cross High School presented demonstrations in two elementary schools in their home town, Merrill, Wis.

The members of the SCIENCE CLUB at St. Ursula Academy, Toledo, Ohio, have increased their club treasury by making pillows out of cattails and pine. The latter could be a Christmastime seasonal project for clubs.

The UNIOTO SCIENCE CLUB at the Union-Scioto High School, Chillicothe, Ohio, is having its most effective program this year with meetings every two weeks and alternating programs between speakers, field trips and experimental activities.

Elementary students are being taught basic science courses by the members of the SCIENCE CLUB at Titusville High School, Titusville, Fla.

The MINERAL SPRINGS SCIENCE

CLUB at the Mineral Springs High School, Winston-Salem, N. C., has a club project for improvements in its science department. Members have already purchased and installed an exhaust fan, built shelves in the stockroom and obtained a refrigerator for the department.

The NUCLEUS SCIENCE CLUB members at Fremont Jr. High School, Seaside, Calif., have an Enrichment Program at 7:30 a.m. for 45 minutes before school starts each morning. They broadcasted a half-hour skit on a local radio program last month. For a week, they had an hour broadcast daily on modern science findings, using tapes made in their science classes.

For three years, HAMILTON'S SIXTH GRADERS at the Vena Stuart School, Gallatin, Tenn., have obtained mice from the National Dairy Council for nutritional experiments as a part of their science study.

The members of the FULTON JR. HIGH SCHOOL SCIENCE CLUB, Fulton, Miss., are concentrating on safety programs, student demonstrations and home projects.

The CARTHAGE HIGH SCHOOL SCIENCE CLUB, Carthage, Mo., organized 17 years ago, gives science assemblies for the student body and prepares science floats for all school parades.

SHARE YOUR IDEAS with other clubs by sending a report of your activities to Miss Leslie Watkins, executive secretary, Science Clubs of America, 1719 N St., N.W., Washington 6, D. C.

## PUBLIC HEALTH

## Flu Epidemic Scare Causes Vaccine Shortage

► A NATIONWIDE FLU EPIDEMIC scare has created a severe shortage of flu vaccine.

An unusual demand for the flu vaccine has exceeded the expected demand predicted by U.S. public health officials. Pharmaceutical companies are now stepping up production to cut down the shortage.

The Public Health's Communicable Disease Center in Atlanta, Ga., told SCIENCE SERVICE in a telephone interview that there is no Asian flu (Type A) in the country, and that only three communities definitely have Type B influenza.

Dr. George Denniston, chief of the Center's influenza surveillance unit, said Type B influenza has been isolated so far in Miami, Fla., the greater San Francisco area in California and on Hopi and Navajo reservations in Arizona.

"At this time of year we expect a great deal of respiratory disease," Dr. Denniston said, "and we have no crystal ball to predict whether or not influenza will develop in epidemic proportions."

The Public Health Service in Washington said it had emphasized the vaccination of the three high-risk groups—those with chronic lung troubles, pregnant women and the elderly. These groups make up about 17,000,000 of the nation's population.

Pharmaceutical companies had planned to manufacture enough vaccine to take care of 18,000,000 persons, but an overwhelming response to vaccination warnings quickly depleted all available supplies.

• Science News Letter, 80:429 December 30, 1961

## ASTRONOMY

## Earth and Planets Formed From Dust Drawn to Sun

► THE EARTH and all the other planets of the solar system were formed from tiny dust particles accumulating around the sun as it passed through a vast dust cloud in space.

This theory on the origin of the solar system was proposed in London by Prof. R. A. Lyttleton of Cambridge University, Cambridge, England. If true, planets around other sun-like stars would be quite common.

Dr. Lyttleton suggests that the sun must have passed through several hundred if not thousands of dust clouds during its lifetime of several billion years. During one of these encounters, the sun's speed relative to the cloud must have slowed down to a little more than a mile a second in order to accumulate the necessary amount of dust for later planet formation.

Such a speed would probably occur at some time for any star during very long periods of time. According to Dr. Lyttleton's theory, the sun or other stars would be formed at one time, then later would acquire from a dust cloud the necessary material for planets.

• Science News Letter, 80:429 December 30, 1961

• Science News Letter, 80:429 December 30, 1961

## INVENTION

# Patents of the Week

► A BUSINESS MACHINE for small offices that cannot afford large electronic computers for preparing their business forms has been patented.

The machine, which is in production, is relatively simple and inexpensive. When not needed for accounting purposes, it can be used as a typewriter. The typewriting calculating machine won patent No. 3,012,713 and No. 3,013,250, awarded respectively to Richard K. Richards of Wappingers Falls, N. Y., and Gerald A. Maley of Poughkeepsie, N. Y. Both assigned rights to International Business Machines Corporation, which manufactures the device as the IBM-632.

This machine is compact and moderately rapid. It automatically accomplishes a limited number of arithmetic computations and records the results. The information for computation can be entered by an operator in much the same way as typing, and no special training in accounting is needed to operate the machine.

Among other patents granted recently was No. 3,012,728, awarded to Gene R. Marner of Marion, Iowa, who assigned rights to Collins Radio Company, Cedar Rapids, Iowa. Mr. Marner devised a computer for determining the apparent position of any satellite. It will continuously show the satellite's correct ascension and declination.

Reginald P. R. L. Saunders of Toronto, Canada, has developed a slide rule kind of calculator to determine the center of gravity for an airplane. He was awarded patent No. 3,012,715 and assigned rights to The De Havilland Aircraft of Canada, Ltd. No mathematical computations are necessary to use the device, which has a graph scale showing how the plane's center of gravity varies with changing loads.

Two games related to airplanes and space were invented by the same man. For his "spaceship navigation game apparatus" Sol Friedman of the Bronx, N. Y., was granted patent No. 3,012,368. The game simulates the operation of a spaceship from the earth to a satellite or planet, one purpose being to correct the dangerous conditions that could occur as the vehicle travels through space.

Mr. Friedman also won patent No. 3,012,780 for his "jet dogfight game." This provides for two model airplanes manually operated to rotate about circular orbits. Points are scored when a player maneuvers his plane into a position where it can hit the opponent's plane. The requirement that each player must adjust both speed and position makes the game more instructive than when position is the only basis for winning, Mr. Friedman claims.

A method for growing strain-free crystals by flame fusion won patent No. 3,012,374 for Leon Merker of the Bronx, N. Y., who assigned rights to the National Lead Company of New York. Although synthetic crystals have been produced by flame fusion for many years, one problem plaguing their manufacturers has been to make them

strain-free. Mr. Merker accomplishes this by controlling the temperature within the furnace chamber for long periods of time after the flame used to produce the crystals has been extinguished.

Graham Trippe of Chicago has developed a bird-repellent light for which he received patent No. 3,013,145, assigning rights to the Trippe Manufacturing Company, also of Chicago. The light will not hurt the bird or offend bird lovers, he claims.

A cage around the light contains silhouettes of wings on a rotatable platform. As the wing-shaped objects rotate in the bulb's light, they cast shadows that flap up and down like the wings of birds in flight to repel unwanted birds.

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## DENTISTRY

## Dental X-Rays Safe, Nationwide Study Shows

► THE AVERAGE DENTIST is operating X-ray machines under safe conditions, a survey of approximately 2,000 dental offices has shown. Some operators, however, are receiving too much radiation.

Ten dental schools cooperated with the University of Illinois College of Dentistry in Chicago on a study of the status of radiation hygiene in dental offices in the Central, Pacific Coast and Atlantic Coast areas.

Dr. Seymour H. Yale, head of the department of radiology, has reported to the American Dental Association that there has been an improvement during the three-year period since data were compiled in a previous survey in Chicago. Unpublished data from a second Chicago survey made in 1960, Dr. Yale said, "compare favorably with those of the ten-state investigation."

The investigators found, however, that some dentists are operating unsafely with respect to roentgen dose to the operator himself.

"Many dentists are receiving more than the permissible dose per second," Dr. Yale said, "and are safe only because of limited utilization of X-ray equipment." He referred to Handbook 76, "Medical X-ray Protection Up to Three Million Volts," National Bureau of Standards, U. S. Department of Commerce.

Profession-wide interest has been found in the radiation control problem. A large number of requests for surveys were received from dentists not included in the study. Approximately one out of every 49 dentists in the United States was involved in the survey.

The problem of radiation hazards in dentistry will be solved, the radiologist said, when all dental X-ray machines "are properly filtered and collimated and high-speed dental X-ray film is used."

The survey included 1,955 dental X-ray machines.

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**DIET EXPERIMENT**—Dr. Marjorie Nelson of the University of California observes the effect of diet on two pregnant animals.

## NUTRITION

## Birth Defects Traced To Diet Deficiency

► PROPER DIET in the early stages of pregnancy is vital to prevent birth defects.

A pregnant woman must have a diet adequate in vitamins and minerals during her early pregnancy, the National Foundation-March of Dimes points out. To find out just how the absence of these substances affects offspring, the Foundation is sponsoring research with animals.

Dr. Marjorie Nelson, working under a March of Dimes grant at the University of California, has demonstrated in her San Francisco laboratory that even a temporary deficiency of a vitamin such as folic acid during early pregnancy can cause birth abnormalities in young laboratory animals.

The defects range from the relatively minor to the very severe, including brain damage, displacement of intestinal organs, or malformations of the heart and eyes.

When Dr. Nelson puts normal pregnant animals on a folic-acid-deficient diet during the second week of pregnancy, at least 80% of the embryos die or are malformed.

However, if she carries out the same experiment about a week earlier or later, the young appear to suffer no adverse effects, thus underlining the importance of proper diet at the critical stages of pregnancy. In a woman, the comparable period of pregnancy extends primarily from the second to the eighth week of the baby's development.

Because of the increasing problem of birth defects, the National Foundation-March of Dimes has recently set up a number of special treatment and clinical study centers in various parts of the country. It is estimated that significant malformations occur in one out of every 16 babies born in the U.S. each year.

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## GENERAL SCIENCE

# Science Forecast for 1962

**Instruments on moon, measles protection, communication and weather satellites, and possible "breakthroughs" in cancer, thermonuclear power predicted by Watson Davis.**

► **THE YEAR 1962** will see instruments flung into space that reach the moon and the vicinity of the planet Venus, sending back information on their mysteries.

The menace of thermonuclear world war will hang like a sword of Damocles over both the Western and Soviet worlds. Clouds of radioactive debris from the hundreds of megatons of 1961 Russian testing will sift down in the rains of spring and summer, sowing the genetic seeds of damaged human beings for generations to come.

Production and use of one or more measles vaccines seems assured for the coming year, giving the means to control this disease, particularly in children, as effectively as other preventable diseases, such as polio, smallpox and diphtheria.

Among the less assured achievements of science that may come to fruition in 1962 are:

1. Success in harnessing the immense energy of the fusion reaction of the thermonuclear or hydrogen bomb to controlled useful power. Large resources have been directed to this end and results are overdue.

2. Discovery of a chemotherapeutic agent for treating and controlling some of the major forms of human cancer. The millions of dollars being spent and the research brains being used should bring results.

3. Accelerated efforts to develop practical artificial photosynthesis, capturing of the sun's energy. Growing knowledge of the manner in which the green leaf operates makes this the next logical step.

## Space Events Foreseen

In man's rush into space, events can be foreseen.

The United States has scheduled orbital flights of astronauts, catching up with the Russians on their placing of men in space around the earth. An impact or hard landing of instruments upon the moon, Operation Ranger, is scheduled during the year. This first placing of instruments on the moon will be followed, probably in early 1963, by a softer and more gentle landing of instruments with more probability that they will send back from the moon information of scientific importance. Using giant booster rockets, such as the Saturn and Nova, space craft will be flung toward the planets Mars and Venus, not carrying men, but carrying instruments which, in all probability, will give us information about those planets that hide their many mysteries at the present time. Perhaps the Soviets will try to send a space ship carrying a man around the moon.

There will be satellites around the earth that will fulfill the promise of these man-made moons, which will be useful in pro-

viding communications throughout the world at all times. In the past two or three years, the usefulness of satellites for communication purposes has been demonstrated, but the ones that will enter space during 1962 will be more sophisticated and approach a stage that will be of practical world-wide use. There will be a launching of Relay, an active communications satellite. Telstar, the Bell System's active communications satellite, is also scheduled for launching in the spring, for experiments in long-distance telephone, TV and data transmission by satellite.

The success of the experimental Tiros satellites in spotting hurricanes and other weather in the earth's atmosphere will lead to a Nimbus operational weather satellite, the first of its kind. There will be more extensive and faster exchanges in weather information between various nations.

Two ion engines, one using mercury, the other cesium as fuels, will be flight-tested late in 1962 to find out how they function under actual space conditions. Such engines could be used for long space trips to other planets in the solar system.

The first global survey of the topside of the ionosphere by satellites carrying special ionospheric radars are scheduled. The topside sounder satellite is a joint U.S.-Canadian venture.

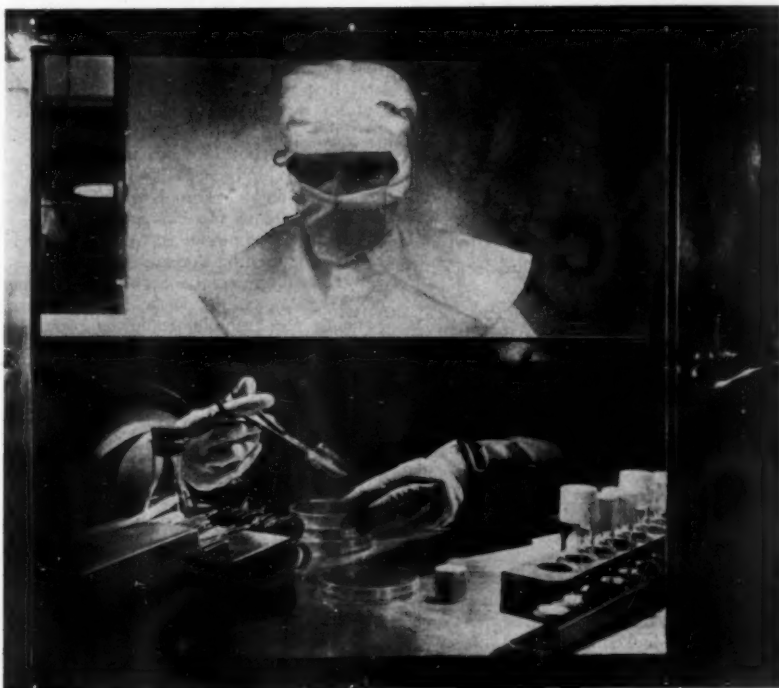
Changes in high atmospheric density, both with latitude and with time, will help explain major ionospheric variations, including the major storms which disrupt radio communications. Much progress may be made relating large-scale motions in the ionosphere with phenomena in the stratosphere and intervening atmospheric layers.

Special radars aimed at the sun will contribute to understanding of the corona and perhaps the gas clouds emitted by the sun toward the earth.

## Rockets Probe Atmosphere

Meteorological rockets sampling temperatures and winds to 50-mile altitudes will be made much more often and from scores of places, marking the beginning of a global network taking "high meteorological" data.

There is growing concern about the accuracy of the intergalactic distance scale, which depends much upon a knowledge of the luminosity of cluster-type variable stars. It is hoped that within one or two years, much new information of a fundamental nature on the luminosity of these stars will be available.



**DEVELOPING MEASLES VACCINE**—Scientist from Pitman-Moore Co. minces tissue that may be used in the long-awaited measles vaccine.

Much progress has been made on the perfection of useful electronic cameras or image tubes. At present, only one such tube is in routine use in the U.S., the Lallemand Electronic Camera at the Lick Observatory. Within a year, several other image tubes of different types will probably go into service in other U.S. observatories.

Radio waves from Mars will be established, possibly a radar contact.

The 210-foot Parkes (Australia) radio telescope will contribute important results in "radio stars."

There will be better understanding of hurricane mechanisms, especially the way they are formed. Partly through new buoy stations, analysis of air-sea interaction processes will be advanced.

Studies will bring new understanding of the movements of fallout from stratosphere to lower levels.

Work on the small-scale structure in jet streams will show their relation to turbulence; possibly there will be better understanding of the whole mechanism of formation and maintenance of these streams.

An automatic seismograph station powered by a radioactive cesium-137 battery will be lowered to the floor of the Atlantic Ocean to report earth tremors. There will be distributed about the world 125 complete seismographs having uniform characteristics. While these are made possible by the necessity of having means to detect atomic test explosions, they will contribute in a major way to understanding the crust of the earth and its movements.

The study of primary electrons in the cosmic radiation, opened up anew in 1961, will be intensified. Attention will be focused on the question of whether an appreciable fraction of these electrons are positrons, since this would give information about the origin of the electrons.

Continued investigation of ultrahigh-energy interactions ("jets") of cosmic rays, exceeding a million million electron volts in energy, will reveal new information about nucleons, the building blocks of nuclei. The research on "jets" will be made possible by a second balloon-flight exposure, at 100,000-foot altitude, of a huge, 80-liter stack of special photographic emulsion.

One hundred kilogauss magnetic fields with superconducting magnetic coils will be produced. The operation of Cambridge, Mass., Electron Accelerator at 6,000 Mev should give a new energy record for electrons, and initiate new research in high energy particle physics.

Besides the measles vaccine expected, probably Type III of the Sabin live oral poliovirus vaccine will be licensed in addition to Types I and II now authorized.

A vaccine for infectious hepatitis is probably imminent now that the virus has been isolated. The search for cancer virus may be successful. Progress in the research now being done on leukemia is hoped for.

Research on cholesterol may show whether or not it is the culprit causing hardening of the arteries and consequent heart attacks.

The next few years should begin to see

some definitive work on the psychiatrically active drugs.

The next year will be an important one in determining the reaction that government, Federal and state, will take toward the report and recommendations of the Joint Commission on Mental Illness and Health.

Dating of the Chellean man from Olduvai by the potassium-argon method may be expected. There will be new information on Acheulean man of Europe and new discoveries of ancient man or fossil ape men in Africa.

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#### MEDICINE

## Spinal Cord Tumor Danger

► THE GENERAL PHYSICIAN confronted with patients suffering low-back pain should be on the lookout for spinal cord tumor, according to a study at the Mayo Clinic, Rochester, Minn.

Wrong diagnoses of "slipped disks" had been made in some of the 100 spinal tumor cases at the Mayo Clinic followed up by Drs. Craig W. Norstrom, James W. Kernohan and J. Grafton Love. The findings were reported in the *Journal of the American Medical Association*, 178:1071, 1961.

Spinal fluid analysis and follow-up examinations should be done to be sure the diagnosis of patients' low-back pain is correct, the investigators report.

Physicians also read a report in their official magazine by Johns Hopkins University surgeons on 118 patients treated by external heart massage (p. 1063).

An accompanying editorial emphasizes that this method could be used by rescue and first aid squads to save the lives of persons who otherwise would die of electrocution, suffocation, drowning, heart attacks and reaction to drugs (p. 1102).

Dr. James R. Jude, Dr. William B. Kouwenhoven and G. Guy Knickerbocker reported the Johns Hopkins study.

Germfree techniques in animal research can also be used on humans, three researchers at the Germfree Laboratory, University of Arkansas, Little Rock, report. Burn patients, for example, could be protected from "staph" germs, *Staphylococcus aureus*, by placing them or the burned part of the body in an isolator (p. 1084).

Drs. Jerome J. Landy, James H. Growdon and Russell L. Sandberg reported the study.

A study of 617 patients with high blood pressure showed kidney artery obstructions in 173 at the Cleveland Clinic Foundation, according to Dr. Eugene F. Poutasse. Of these, 126 were treated surgically (p. 1078).

Winter as well as summer air conditioning can affect the nose and throat, Dr. S. A. Friedberg, nose and throat specialist, Chicago, says in reply to a query from a Texas doctor.

"In large buildings the accomplishment of adequate humidification is expensive and difficult," Dr. Friedberg states. "A person may obtain relief for dry nasal membranes with one percent or two percent ephedrine

#### MEDICINE

## Germfree Research Mice Now Priced at \$5

► GERMFREE rats and mice useful in making studies of various disease conditions will shortly be available at relatively low production costs. Dr. P. C. Trexler of Lo-bund Laboratories at the University of Notre Dame told the Animal Care Panel in Boston that production costs for gnotobiotic (germ-free) animals is now \$5 for a mouse and \$20 for a rat.

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sulfate in isotonic sodium chloride solution used three or four times daily by medicine dropper" (p. 1123).

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#### EDUCATION

## Women Spark Gain In Science, Math Degrees

► THE NUMBER of college graduates getting bachelor's degrees in science and mathematics during the 1960-61 academic year is expected to show an increase of about 2.7% over the previous year; the U.S. Department of Health, Education and Welfare reports.

The overall increase, HEW notes, is "due very largely to the increasing numbers of women" taking up science and mathematics. The expected increase is 11.5% for women graduates, compared with only four-tenths of one percent for men graduates.

The HEW figures are based on an Office of Education survey of junior year enrollments in the fall of 1959. After the 1958-59 academic year, actual figures on the number of graduating seniors are not available.

Canvassing 1,132 institutions, researchers found 57,265 juniors majoring in science and mathematics in 1959. Of these, 78%, or a total of about 44,600, were expected to be graduated the following academic year.

The juniors in science and mathematics made up 13.8% of the 414,000 total junior enrollment. In the previous year, the 55,777 science and mathematics majors out of a 405,000 total also comprised 13.8%.

The expected annual increase in graduates totals only 2% among the 30,551 enrolled in publicly controlled schools, but 3.4% among the 26,714 in privately controlled schools.

Despite the upward trend in women enrollees, the untapped reservoir of scientific and mathematical talent is still far greater among women than among men. Only 8.7% of women juniors, compared with 16.6% of men juniors, were science and mathematics majors in the fall of 1959.

The one year changes also are expected to reflect heightened interest in mathematical subjects via a 17.6% increase.

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## GENERAL SCIENCE

# Additive Suit Dismissed

► THE SUIT against the Government brought by the manufacturer of battery additive AD-X2 has been dismissed "with prejudice."

Dr. Allen V. Astin, director of the National Bureau of Standards, said this was the first time that a suit referred to the U. S. Court of Claims by Congress has been dismissed with prejudice, which means the suit cannot be brought again. The complaint claimed damages of about \$2,400,000 because of the alleged actions of the National Bureau of Standards in connection with the battery additive.

The suit against the Government was referred in 1957 to the Court of Claims by the House of Representatives, following a long and often bitter controversy over the additive.

Dr. Astin said he was particularly happy because the Department of Justice achieved

dismissal of the suit without resorting to expensive trial procedures. The dismissal was requested by the plaintiff after being advised in pre-trial conferences of the nature of the Government's defense of the suit.

In April, 1953, Dr. Astin was dismissed as director of the National Bureau of Standards by then Secretary of Commerce Sinclair Weeks because of displeasure over a report on storage battery additives. After much furor, Dr. Astin was temporarily reinstated. Then, after a thorough investigation by the National Academy of Sciences, Dr. Astin was permanently reinstated.

Secretary Weeks accepted and endorsed the Academy's report giving the National Bureau of Standards a clean bill of health with respect to the battery additive tests, then resigned slightly later.

Both the Post Office Department and the Federal Trade Commission as well as the Senate Small Business Committee were involved in the controversy concerning the battery additive during the mid-1950's.

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## PUBLIC HEALTH

## Have Cholera Vaccination If Going to Philippines

► ALL AMERICANS going to the Philippine Islands are advised to take precautions against possible cholera contacts, Dr. Ralph W. McComas, foreign operations chief, Division of Foreign Quarantine, U. S. Public Health Service, told SCIENCE SERVICE.

Vaccination against cholera is advised, although the present outbreak in the Philippines does not appear to be a true cholera, but a paracholera, Dr. McComas said. People leaving the Islands, must also have valid certificates against cholera.

So far, the outbreak, which has been of epidemic proportions in rural areas of the Philippines since October, is not believed to be serious enough to be internationally quarantinable, Dr. McComas said, but routine precautions are being taken.

The Philippines Embassy in Washington, D. C., said some volunteer teams in the Philippines were going into the central and southern areas to give vaccination against cholera.

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## RADIO

## Radar Yardstick to Sun Most Powerful in World

See Front Cover

► THE FIRST SUCCESSFUL results in a long-term study of radar reflections from the sun have been announced by the Massachusetts Institute of Technology. The measurements were made with a new very high frequency space radar system recently installed in Texas by MIT's Lincoln Laboratory. The first radar contacts with the sun were made by the Space Radioscience Laboratory of Stanford University, but this is the first time extended regular measurements have been possible.

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## RADIO ASTRONOMY

## West Ford Needles Could Orbit 100 Years

► THE COPPER NEEDLES of Project West Ford could stay in earth orbit 100 years if they ever are ejected from their canister and spread into an earth-circling band of reflecting radio waves as originally planned.

The century lifetime was estimated by Dr. S. F. Singer of the University of Maryland, now at the University of California's Jet Propulsion Laboratory, Pasadena, Calif. He reports in the British scientific journal, *Nature*, 192:1061, 1961, that the lifetime of the needles could be 100 years if their charge is only one-tenth of a voltage unit more than expected.

The canned copper wires were carried into orbit aboard a Midas satellite on Oct. 21 from Point Arguello, Calif. The project was bitterly opposed by many astronomers, particularly radio astronomers, and received a vote of opposition by the International Astronomical Union at its Berkeley meeting.

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# Questions

**GEOPHYSICS**—How far above the earth does the helium halo extend? p. 427.

**MEDICINE**—Which wrong diagnosis was made in cases of spinal tumors? p. 432.

**PUBLIC HEALTH**—What groups are considered high influenza risks? p. 429.

**Photographs:** Cover, Massachusetts Institute of Technology, Lincoln Laboratory; p. 427, Dr. Robert Jastrow; p. 429, Science Service; p. 430, University of California; p. 431, Pitman-Moore Co.; p. 436 Eastman Chemical Products, Inc.

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# Books of the Week

For the editorial information of our readers, books received for review are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C.

**AIR FORCE SCIENTIFIC RESEARCH BIBLIOGRAPHY, 1950-1956**—G. Vernon Hooker and others—*AFOSR (GPO)*, 1150 p., illus., \$6.75. Brings together abstracts of all publications produced during six years of research supported by the Air Force Office of Scientific Research.

**APPLIED ELASTICITY**—John Prescott—*Dover*, 666 p., diagrams, paper, \$2.95. Reprint of 1924 edition, develops elasticity from theoretical principles, oriented toward practical problems faced by the engineer.

**THE BIOLOGY OF THE HYDRA AND OF OTHER COELENTERATES, 1961**—Howard M. Lenhoff and W. Farnsworth Loomis, Eds.—*Univ. of Miami Press*, 467 p., illus., \$4.50. Current research presented at symposium on the Physiology and Ultrastructure of Hydra, held at Coral Gables, Fla.

**COMPUTERS: Key to Total Systems Control**—A. B. Shafritz and others—*AFIPS (Macmillan)*, 380 p., illus., \$12. Proceedings of the 1961 Eastern Joint Computer Conference, covering system simulation, current status of programming, language standardization, equipment, communication systems, programming and applications.

**CRUSADE FOR WILDLIFE: Highlights in Conservation Progress**—James B. Trefethen—*Stackpole*, 377 p., illus., by Carl Rungius and Bob Hines, \$7.50. Comprehensive account of the evolution of the conservation idea and its achievements, based on material from the archives of the Boone and Crockett Club.

**DESIGN OF REGIONAL ACCOUNTS: Papers presented at Conference on Regional Accounts, 1960**—Werner Hochwald, Ed.—*Johns Hopkins Press*, 281 p., \$6. Pioneer investigations of a group of economists into ways and means of organizing appropriate data to serve as a frame-

work for regional analysis of urban development problems.

**ELECTRONICS: A Bibliographical Guide**—C. K. Moore and K. J. Spencer—*Macmillan*, 411 p., \$15. Describes and evaluates 2,000 books and periodicals in 68 separate areas in the field of electronics, foreign titles translated into English, author and subject index.

**AN ELEMENTARY TREATISE ON ELLIPTIC FUNCTIONS**—Arthur Cayley—*Dover*, 386 p., paper, \$2. Unabridged reprint of second edition published in 1895.

**FLUID MECHANICS FOR HYDRAULIC ENGINEERS**—Hunter Rouse—*Dover*, 422 p., illus., paper, \$2.25. Unabridged reprint of 1938 edition.

**GREEK SCIENCE: Its Meaning for Us**—Benjamin Farrington—*Penguin Bks*, 320 p., paper, \$1.45. Describes the various phases of the development of science among the Greeks, from about 600 B.C. to Ptolemy and Galen in the second century A.D.

**HIGH SCHOOL PUPIL PROGRAMS: A Preliminary Report**—Edith S. Greer and Richard M. Harbeck—*OE (GPO)*, 31 p., paper, 20¢. A study comparing pupil ability and academic credit, program patterns of academic work.

**HIGHER GEOMETRY: An Introduction to Advanced Methods in Analytic Geometry**—Frederick S. Woods—*Dover*, 423 p., paper, \$2. Thorough presentation of the general concepts and methods of advanced algebraic geometry, reprint of 1922 edition.

**AN INTRODUCTION TO CLINICAL ELECTRO-ENCEPHALOGRAPHY**—Robert R. Hughes—*Wright & Brown (Williams & Wilkins)*, 118 p., illus., \$7. Concise summary of the main features of E.E.G., explaining E.E.G. changes in epilepsy, in brain damage, psychiatric conditions and endocrine abnormalities.

**AN INTRODUCTION TO THE THEORY OF CANONICAL MATRICES**—H. W. Turnbull and A. C. Aitken—*Dover*, 200 p., paper, \$1.55. Mathematical treatise on the various ways in which matrices of finite order can be reduced to canonical form under different types of transformation. Reprint of 3rd (1952) edition.

**THE LONG-RANGE DEMAND FOR SCIENTIFIC AND TECHNICAL PERSONNEL: A Methodological Study**—Bureau of Labor Statistics—*NSF (GPO)*, 70 p., paper, 50¢. Projections of scientific and engineering employment to 1970.

**MATHEMATICAL METHODS FOR SCIENTISTS AND ENGINEERS**—Lloyd P. Smith—*Dover*, 453 p., diagrams, paper, \$2. Unabridged republication of first (1953) edition.

**THE MEDICAL ANNUAL: A Year Book of Treatment and Practitioners' Index, 1961**—*Wright & Sons (Williams & Wilkins)*, 79th ed., 610 p., illus., \$8. A documented practical summary of recent progress in medical and surgical practice.

**MEMBRANE TRANSPORT AND METABOLISM: Proceedings of Symposium held in Prague, 1960**

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A. Kleinzeller and A. Kotyk, Eds.—*Academic Press*, 608 p., diagrams, \$20. Papers and discussion on general aspects of transport phenomena, in particular on the transport of ions and water, sugars, amino acids and amines across cellular and biological membranes; indexed.

**MEMORY: Facts and Fallacies**—Ian M. L. Hunter—*Penguin Bks*, 185 p., paper, 95¢. Psychologist reports on the processes of remembering and forgetting as established by experiments.

**MODERN FOREIGN LANGUAGES IN HIGH SCHOOL: The Language Laboratory**—Joseph C. Hutchinson—*OE (GPO)*, 85 p., illus., paper, 35¢. Discusses laboratory facilities, equipment functions, and operating and teaching techniques.

**MODERN THEORIES OF INTEGRATION**—H. Kestelman—*Dover*, 2nd rev. ed., 309 p., paper, \$2. New edition contains chapter on Riemann-Stieltjes integration, and a supplementary section of 186 exercises.

**NEW MATHEMATICAL LIBRARY, Vol. 2: What Is Calculus About?**—W. W. Sawyer—*Random House (Library Publishers)*, 118 p., diagrams, \$2.95. Library bound edition of supplementary text series published under the auspices of the School Mathematics Study Group.

**ORE MICROSCOPY**—Eugene N. Cameron—*Wiley*, 293 p., illus., \$10.50. Presents theory and technique of microscope investigation of ore minerals, ores, and mill products produced by beneficiation of ores.

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